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ABSTRACT

The effect of an advance organizer on post test performance was studied in a 2 X 2 X 2 factorial design with the effects of the organizer, pretest and mathematics learning passage controlled. An advance organizer of approximately 500 words and a learning passage of approximately 1,000 words were developed. A 41-item multiple choice test based on the three levels of Bloom's taxonomy was also developed. Two hundred college students were randomly assigned to treatments wherein the interaction of pretest, advance organizer, and learning passage were systematically varied. When the learning passage and an advance organizer were presented together, no significant differences in post test scores were found. On the other hand, in the absence of a learning passage, the presence of an advance organizer did result in significantly higher post test scores as opposed to the absence of an advance organizer. The results also indicated that the interaction of pretest and advance organizer yielded significant improvement in post test scores. Thus, there is reason to believe that the combined effect of a pretest and an advance organizer is important in improving post test scores. The findings are discussed as they relate to previous studies identifying interaction effects. (Author/MV)

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THE ADVANCE ORGANIZER CONCEPT: SOME METHODOLOGICAL QUESTIONS

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The Advance Organizer Concept:
Some Methodological Questions.

The advance organizer concept developed by Ausubel has attracted a continuing research interest since the early 1960's. Over 200 studies have been reported which attempted to evaluate the position taken by Ausubel that advance organizers facilitate learning and retention. To date, the results of these research efforts remain somewhat clouded. It is possible that there are both definition and methodological problems that contribute to the equivocal results in this area of research.

An excellent article by Barnes and Clawson(3) summarized the findings from thirty-two studies on the advance organizer concept. Twelve of these studies reported that advance organizers facilitated learning while twenty studies reported no such relationship. Barnes and Clawson also classified these studies according to selected variables to determine, if possible, whether any consistent patterns emerged. They concluded that no clear patterns were present when such variables as length of study, ability or grade level of subjects, type of organizer, and cognitive level of the learning task were analyzed separately. These authors concluded that advance organizers, as presently constructed, generally do not facilitate learning as claimed by Ausubel.

An important section of the study by Barnes and Clawson was a number of recommendations that are relevant to the present study. These recommendations included: a) Attempts should be made to operationalize the advance organizer, b) Studies should continue

for longer than ten days from pre-test to post-test to control for short-term memory effects on recall and, c) The dependent variable should sample a number of levels of the cognitive domain.

Hartley and Davies(4) evaluated a number of preinstructional strategies to determine their effects on performance. Among the preinstructional strategies evaluated were pretests and advance organizers. Hartley and Davies concluded that while the effects of a pretest on performance may be present, a review of the research in this area does not provide evidence that pretests significantly effect later performance. These authors supported the conclusion of Barnes and Clawson(3) that the research findings on advance organizers is confusing. Hartley and Davies also stated that while the advance organizer concept was derived from a sound theoretical base, mthere is no current acceptable way of generating or recognizing an advance organizer. They stated, "Further serious research must await this problem of operationalizing the concept."(4)

Despite the conclusions of reviewers of advance organizer research efforts that the effect of an advance organizer on later learning and retention was not substantiated, a number of studies have been reported where the advance organizer did facilitate learning and retention. Scandura and Wells(5) employed an advance organizer model to evaluate its effect on the learning of mathematical concepts. They employed the traditional research design of the experimental group being exposed to an advance organizer and a control group receiving a historical introduction.

Their hypothesis that an advance organizer would produce superior learning was supported.

Scandura and Wells raised a question about the presence of transfer from the advance organizer directly to the post-test and recommended that future studies include a treatment where no advance organizer material would be presented.

Ausubel also has reported studies of the effect of an advance organizer on learning and retention. A typical study reported by Ausubel(2) used materials dealing with metallurgy. Because measurement of the effects of any learning treatment must be influenced by the subject's ability to acquire knowledge of the material, Ausubel judged the subject's ability to learn unfamiliar technical passages by testing them with an endocrinology learning passage. On the basis of these results, Ausubel equated the experimental and control groups on the assumption that the learning effort would be parallel in difficulty. This assumption may be questionable. It should be mentioned that Ausubel reported positive results in favor of the advance organizer treatment.

It was considered that the confusing results reported in the above cited studies may also be caused by possible interactive effects between the various treatments. As it is also clear from the writings of Ausubel that background knowledge of the material used in a study will effect the measurable results, it seemed rational to actually test the subjects with a pretest on the specific learning material and measure its interaction with other elements.

In summary, the Scandura and Wells(5) question about interactions between the advance organizer and the measure of performance, and the unanswered questions about possible interaction effects in other advance organizer studies provided the impetus for the present study. To date, no studies have been reported which systematically include a number of variables as treatments in a single study.

It is the purpose of the present study to attempt to explore the effect of a number of variables and their interaction upon the learning and retention of material. This study is viewed as exploratory and an hypothesis generating effort.

Design and Procedure:

The basic format for this study was basedcon the following question. If a study was developed in which a pre-test, an advance organizer, a learning passage and a post-test were to be employed, how might one examine the effects of each of these variables and any interactive effects between variables?

This study may be divided conveniently into two phases. Phase one included the development and pilot-testing of the materials to be used. Phase two was the actual study which is reported here. An advance organizer and a learning passage were developed using materials drawn from Chapter two of Ausubel's Psychology of Meaningful Verbal Learning(1). These materials were pre-tested, revised, and retested until an advance organizer of approximately 500 words and a learning passage of approximately 1000 words were developed. A four-choice multiple choice test

was developed using three levels of Bloom's taxonomy. After a number of revisions, a 41-item test with an item discrimination index of .42 and an item/total point-biserial correlation of .60 was developed for use in the study. This test was used as both the pre-test and the post-test.

Phase two was the major study in which the interaction of variables of pre-test, advance organizer, and learning passage were systematically varied across groups of subjects. The study involved eight different groups of subjects and the treatments assigned to each of the eight groups comprised a 2x2x2 factorial experiement. The design is summarized in Table 1.

The assignment of various combinations of treatments to the eight groups of subjects provided a basis for examination of the interactive effects of pairs of treatments as well as the contribution of each variable by itself. Groups G and H were regarded as control groups since they received only the pre-test and/or the post-test without any additional treatment.

For those groups which received the pre-test, this test was administered on the same day to these groups. After one week delay, the advance organizer and learning passage were presented to those groups assigned these treatments. This time delay was included to attempt to reduce the effects of the pre-test on later learning and retention. Ten days later, the post-test was administered to all groups.

Table 1
Summary of Research Design

Group	Pre-Test	Advance Organizer	Learning Passage	Post-Test
A	x	x	x	x
B	-	x	x	x
C	x	-	x	x
D	-	-	x	x
E	-	x	x	x
F	x	x	-	x
G	-	-	-	x
H	x	-	-	x

(x= Treatment present; - = Treatment absent)

Subjects:

The subjects for this study were undergraduate students enrolled in a Criminal Justice course at the University of Florida. This was a multiple-section course which allowed for the assignment of treatments to a given section of the course. Assignment of treatment was randomized across sections but all students in a given section received the same treatment. The total number of subjects was 220.

Results:

Analysis of variance of post-test scores employing the classical experimental approach (because of unequal N's/group) was performed. The alpha level was set at .05.

Table 2 presents the results of the analysis of variance for the various treatments. Of particular interest to the present study were the interactions of treatments. A summary of the analysis of simple effects for significant interactions is summarized in Figure 1.

Table 2
Analysis of Variance

Source of Variation	Sum of Squares	d.f.	Mean Squares	F
Testing(P)	81.25	1	81.25	4.64*
Advance Organizer(A)	16.05	1	16.05	0.92
Learning Passage(L)	124.10	1	124.10	7.08*
P x A	107.06	1	107.06	6.11*
L x A	224.21	1	224.21	12.79*
P x L	0.07	1	0.07	NS
P x L X A	52.30	1	52.30	2.98
Error	3487.29	199	17.52	

(* = .05)

An examination of Table 2 indicates that a significant F was found for the main effects of pre-test(P) and for the learning passage(L). Those groups which received the pre-test did somewhat better than those who did not receive the pre-test(Means of 16.09 and 15.23). The mean post-test score for those groups who received the learning passage was 16.09 while those who did not receive the learning passage had a mean of 14.42. No significant differences

were found for the advance organizer main effect. On the basis of the results from the analysis of the main effects only, one would conclude that the advance organizer did not significantly improve post-test scores while the presence of a pre-test did significantly effect post-test scores. It has been the analyses of main effects such as these that have been the typical results presented by other studies.

A further examination of Table 2 focusing on the interaction of variables provides some additional interesting results. Significant F ratios were found of the interaction of pre-test x advance organizer; for learning passage x advance organizer, but not for pre-test x learning passage. The means for the simple effects for the significant interactions have been plotted and are presented in Figure 1. Examination of these plots as they relate to post-test scores are summarized as follows:

a) In the presence of a learning passage, the advance organizer did not have a significant effect on test scores.

b) In the absence of a learning passage, the advance organizer improved test scores significantly.

c) In the presence of an advance organizer, the learning passage did not effect test scores significantly.

d) In the absence of an advance organizer, the learning passage improved test scores significantly.

e) In the presence of the pre-test, the advance organizer increased test scores significantly.

f) In the absence of the pre-test, the advance organizer did not effect test scores significantly.

g) In the presence of an advance organizer, the pre-test increased test scores significantly.

h) In the absence of an advance organizer, the pre-test did not effect test scores significantly.

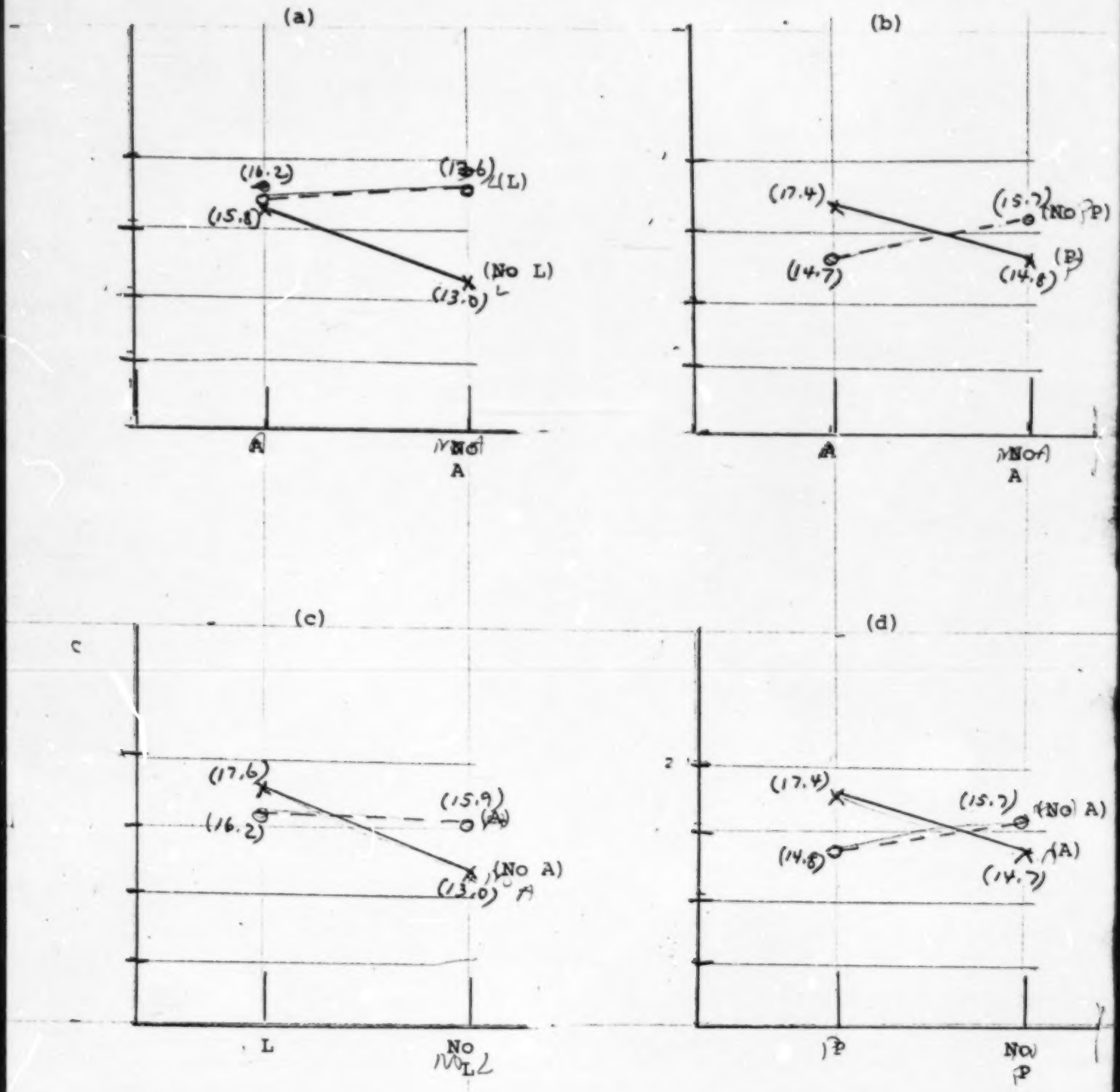

Figure 1
Plots of means for significant
simple effects

To summarize, the findings of the analysis of significant simple effects suggest that the combination of the pre-test with an advance organizer produced significantly higher post-test scores, but the presence of an advance organizer in combination with the learning passage did not significantly improve post-test scores. There were also no significant differences in post-test scores when the test items were analyzed according to the three cognitive levels.

Discussion:

Although the major purpose of this study was to analyze the interactive effects of variables in an advance organizer type of study and the results obtained are not clear cut, an analysis of the significant simple effects as presented in Figure 1 do provide some suggestions about what may be occurring in this type of study. When the learning passage and an advance organizer were presented together, no significant differences in post-test scores were found. On the other hand, in the absence of a learning passage, the presence of an advance organizer did result in significantly higher post-test scores when compared with the absence of an advance organizer. At least in this study, the advance organizer does appear to provide information which is helpful in responding to a post-test and an advance organizer does seem to contribute to learning in some situations. Again, the combination of an advance organizer and learning passage yielded no significant differences, but the presence of the

learning passage in the absence of an advance organizer provided significant improvement in post-test scores when compared to the absence of the learning passage.

The interaction of the pre-test and an advance organizer is also of interest. The combination of pre-test and advance organizer yielded significantly higher post-test scores than the advance organizer by itself. Thus, there is reason to believe that the combined effect of a pre-test and an advance organizer is important in improving post-test scores. If one characterizes the pre-test as being at a low level of abstraction, generality and inclusiveness and an advance organizer at a higher level of abstraction, generality and inclusiveness, the statement of Ausubel that materials presented prior to the learning passage must be at a "higher level of abstraction, generality and inclusiveness" to provide proactive facilitation of learning is not supported. An analysis of the advance organizers used in the Scandura and Wells(5) study indicates that one of the advance organizers that provided for significant improvement in post-test scores was quite concrete. This suggests that the requirement that an advance organizer must be more abstract than the learning passage may not be necessary. Hartley and Davies(4) in their analysis of preinstructional strategies appear to support this contention.

The findings of the present study as well as others mentioned in this paper provide additional support to the statements by both Barnes and Clawson(3) and Hartley and Davies(4) that a clearer definition of the characteristics of an advance organizer is essential. Questions such as what degree of abstractness is necessary to produce improvement in learning and retention remain to be answered. On the basis of the findings of the present study and the review by Barnes and Clawson(3), the facilitating effect of the presence of an advance organizer on learning and retention has not been demonstrated.

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